



**CONESTOGA-ROVERS
& ASSOCIATES**



651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Facsimile: (519) 884-0525
www.CRAworld.com

February 15, 2013

Reference No. 039611

Mr. Rosauero del Rosario
EPA Project Manager/Coordinator
United States Environmental Protection Agency (USEPA)
Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Dear Mr. del Rosario:

Re: Methane Investigation and Monitoring Plan Results
Himco Site
Elkhart, Indiana

On behalf of the Himco Site Trust, Conestoga-Rovers & Associates (CRA) has prepared this summary of the Methane Investigation and Monitoring Plan (MIMP) results for the Himco Site (Site) in Elkhart, Indiana. This report was prepared in accordance with the United States Environmental Protection Agency- (USEPA-) approved MIMP dated November 6, 2012. The MIMP included the following:

- Installation of seven new soil gas probes (SGPs)
- Weekly soil gas monitoring over 4 weeks
- Evaluation of the data, and development of recommended next steps

The results of the investigation and our recommendations are described below.

ADDITIONAL SOIL GAS PROBES

CRA installed seven new SGPs on December 18, 2012. The purpose of the SGPs is to further delineate the potential extent of the methane detected within the vicinity of existing SGPs 107, 110, and 114, where methane was detected at elevated concentrations in September and October 2012. The United States Army Corps of Engineers (USACE) and the Indiana Department of Environmental Management (IDEM) were on Site to observe the SGP installations. Figure 1 presents the locations of the additional SGPs (SGPs 115, 116, 117S/D, 118, and 119S/D). The borehole logs for the SGPs are presented in Attachment 1. The additional SGPs were installed in accordance with Section 2.2.1 of the Field Sampling Plan (CRA, October 2008) and the MIMP. In accordance with USACE's request, SGPs 115, 116, and 118



February 15, 2013

2

Reference No. 039611

were installed approximately 30 feet, 40 feet, and 40 feet, respectively, northeast of the proposed location shown in the USEPA-approved MIMP.

MONITORING

In accordance with the MIMP, CRA monitored the new SGPs and SGPs 107, 110, 114, 13, 14, 15, and 27S/27D once per week between December 28, 2012 and January 17, 2013. The SGPs monitored as part of this investigation are shown on Figure 2. The monitoring included measuring pressure and soil gas quality (methane, carbon dioxide, oxygen, and balance gas) concentrations on a percent-by-volume basis using a Dwyer digital manometer and GEM 2000 gas meter. CRA also monitored pressure and soil gas quality at SGPs 108 and 109 on a voluntary basis.

The pressure and soil gas quality data are presented in Table 1. Table 1 also includes data collected in September and October 2012 during operation and maintenance (O&M) monitoring rounds.

Hydrogen sulfide was detected SGP-114 at concentrations greater than the action level (4.4 percent) for two readings during the monitoring period.

Methane concentrations at SGPs 115, 116, and 118 were greater than 5 percent at least once during the MIMP monitoring period. As shown on the borehole log for SGP 116, peat was encountered during the drilling for SGP 116. This peat formation on Site is a likely source of methane. As summarized in Table 1, the methane concentrations detected at SGPs 115 and 118 decreased significantly over the 4-week monitoring period, indicating that the methane is potentially resulting from a limited carbon source.

As summarized in Table 1, the methane concentrations detected at SGPs 117S/D were less than the action level (5 percent by volume) during MIMP monitoring. Methane was detected twice at concentrations exceeding the action level at SGPs 119S/D. The closest residence to SGPs 119S/D is located at 28369 County Road 10 (Rumfelt), approximately 300 feet to the south.

The soil gas concentrations detected at the remaining SGPs monitored as part of the MIMP were similar to the previous monitoring rounds, as summarized below:

- Methane concentrations were between 29.7 percent and 16.2 percent at SGP-107, except during the fourth monitoring event, when the methane concentration decreased to 11.6 percent.



- SGPs 108 and 109 were added to the weekly monitoring event since the methane concentrations detected at SGP 115 were greater than the action level. The methane concentrations detected at SGPs 108 and 109 fluctuated between slightly greater than and less than the action level, with fluctuating oxygen and carbon dioxide concentrations, indicating unsteady anaerobic activity.
- Methane was not detected at concentrations greater than the action level at SGP 110. Methane concentrations were previously detected in the 50 percent range at SGP 110 in September 2012, indicating a steady anaerobic condition. The lower methane concentrations are indicative of a declining anaerobic condition as the methane and carbon dioxide concentrations approach equality.
- Methane was detected at SGP-114 in the 50 percent range during the MIMP program, which is greater than the concentrations observed in Fall 2012. This may be due to trapped methane under frozen cover soils preventing natural venting, but more data are required to determine if this is the case.
- Methane was either not detected or was detected at low concentrations at SGPs 13, 14, 15, 27S/D during the MIMP monitoring events. The data for these probes indicate that there is a buffer zone between the methane detections close to the landfill, and the residents and receptors near the Site.
- CRA monitored SGP-16 to determine if methane was present or migrating south of SGP-109. Methane has not been detected at SGP-16 to date.

DISCUSSION OF RESULTS

Landfill gas goes through a specific production pattern consisting of five phases of development (Farquhar and Rovers [1973], modified by Rees [1980], Augenstein and Pacey [1991]). Figure 3 presents the typical production stages of landfill gas (Farquhar and Rovers [1973], modified by Rees [1980], Augenstein and Pacey [1991]). The duration of each of the phases is dependent on a number of factors including the type of waste, moisture content, nutrient content, bacterial content, and pH level. General guidelines regarding the length of the decomposition cycle for the various categories of waste are provided on Figure 3. The heterogeneity of the waste, together with the environment within the waste, has a specific bearing on the decomposition cycle.

The results of the monitoring conducted to date at SGP-107 are indicative of gas characteristics ranging from young (early Phase 3) to declining (middle Phase 3) methane production conditions based on the lack of pressure readings and methane and carbon dioxide concentrations. The Fall 2012 data coupled with the MIMP data indicate unsteady gas



February 15, 2013

4

Reference No. 039611

production in the vicinity of SGP-107. Figure 4 presents the convergence of soil gas concentrations over time at SGP-107.

In other areas of the Site, the results of monitoring completed to date indicate a declining methane production condition where the percent methane concentration was initially higher than carbon dioxide concentration, but the methane concentration has diminished considerably, and has since waned. This condition is observed at SGPs 110, 115, and 118. Figure 5 presents a graphical representation of the data that illustrates the decline of methane and carbon dioxide concentrations at SGP-110. Based on the data obtained to date, the concentrations over time are trending similar to a declining (Phase 5) gas production pattern.

Figure 6 presents the soil gas concentrations at SGP-114. Soil gas in vicinity of SGP-114 is in an unsteady condition, where the methane and carbon dioxide concentrations were nearly equal, but the data showed higher methane concentrations than carbon dioxide concentrations in late December 2012 and January 2013. The elevated methane concentrations may have resulted from two different factors: 1) this particular location is entering the fourth phase of steady gas production where the methane concentration is greater than the carbon dioxide concentration; and/or, 2) the seasonal change from fall to winter resulted in frozen cover soils temporarily trapping the methane from release to the atmosphere, resulting in greater methane concentrations than previously measured. Further monitoring through different seasons and weather conditions will aid in refining our understanding of the potential anaerobic activity in the vicinity of SGP-114.

The variability in the soil gas concentrations detected between September 2012 and January 2013 can be attributed to a variety of conditions, including the age of the waste and the relocation of the waste during landfill cover construction activities temporarily reenergizing the waste, resulting in significant variability in concentrations. CRA suspects that the loamy landfill cover installed in 2011 and 2012, which has a lower permeability than the sand that previously covered the Site, is also contributing to the variability in observed soil gas concentrations. The cover may be allowing the methane to vent to the atmosphere more easily in certain locations, thus decreasing the soil gas concentrations at particular soil gas probes, or increasing it at other locations. The presence of peat on Site and varying weather conditions/frozen ground will also have contributed to the variability in the soil gas concentrations observed over the relatively short (4-month) monitoring period since O&M monitoring began.

More data are required to verify the data collected to date, further evaluate conditions at the Site, and determine whether ventilation of the methane detected near the southern perimeter of the landfill is necessary.



The data collected to date indicate that there is a buffer zone south of the landfill. Existing SGPs 13, 14, 15, 16, and 26S/D can be used to verify that receptors south of the Site are not subjected to elevated methane concentrations. The data collected to date show that the soil gas concentrations are in a state of flux or change, most likely due to the waste being relocated during construction, the presence of naturally occurring peat on Site, and installation of a soil cover that is less permeable than the native sand surrounding the Site. The soil gas readings should stabilize over time.

RECOMMENDATIONS

CRA recommends additional data collection to allow us to further evaluate the effects of seasonal variations on gas concentrations on Site, and determine if the methane concentrations observed to date will continue to decrease. CRA recommends monthly soil gas monitoring at SGPs 107, 108, 109, 110, 114, 115, 116, 118, 119S/D, 27S/D, 13, 14, 15, and 16. Quarterly monitoring will continue at these SGPs and other SGPs in accordance with the O&M Plan (CRA, 2012). The monitoring will be completed in accordance with the procedures in Section 3.2 of the O&M Plan on a monthly basis, for 6 months (February through August 2013). CRA will submit a data report and recommendations within 30 days of the sixth monitoring event (in September 2013).

To avoid unnecessary reporting and contingency monitoring events, CRA proposes not to implement the O&M Plan contingency monitoring schedule (daily monitoring of soil gas concentrations) and will not notify USEPA within 24 hours of observing soil gas at concentrations exceeding the action level, since we have already determined that elevated concentrations of soil gas may be detected at select SGPs. However, if soil gas concentrations exceed the action levels at SGPs located within the buffer zone south of the Site (including SGPs 13, 14, 15, 16, 25S/D, 26S/D, and 27S/D), we will notify USEPA and will increase the frequency of monitoring to a frequency approved by USEPA.



**CONESTOGA-ROVERS
& ASSOCIATES**

February 15, 2013

6

Reference No. 039611

Please contact Denise Quigley at (519) 884-0510 or Douglas Gatrell at (734) 453-5123 if you have questions or require additional information.

Yours truly,

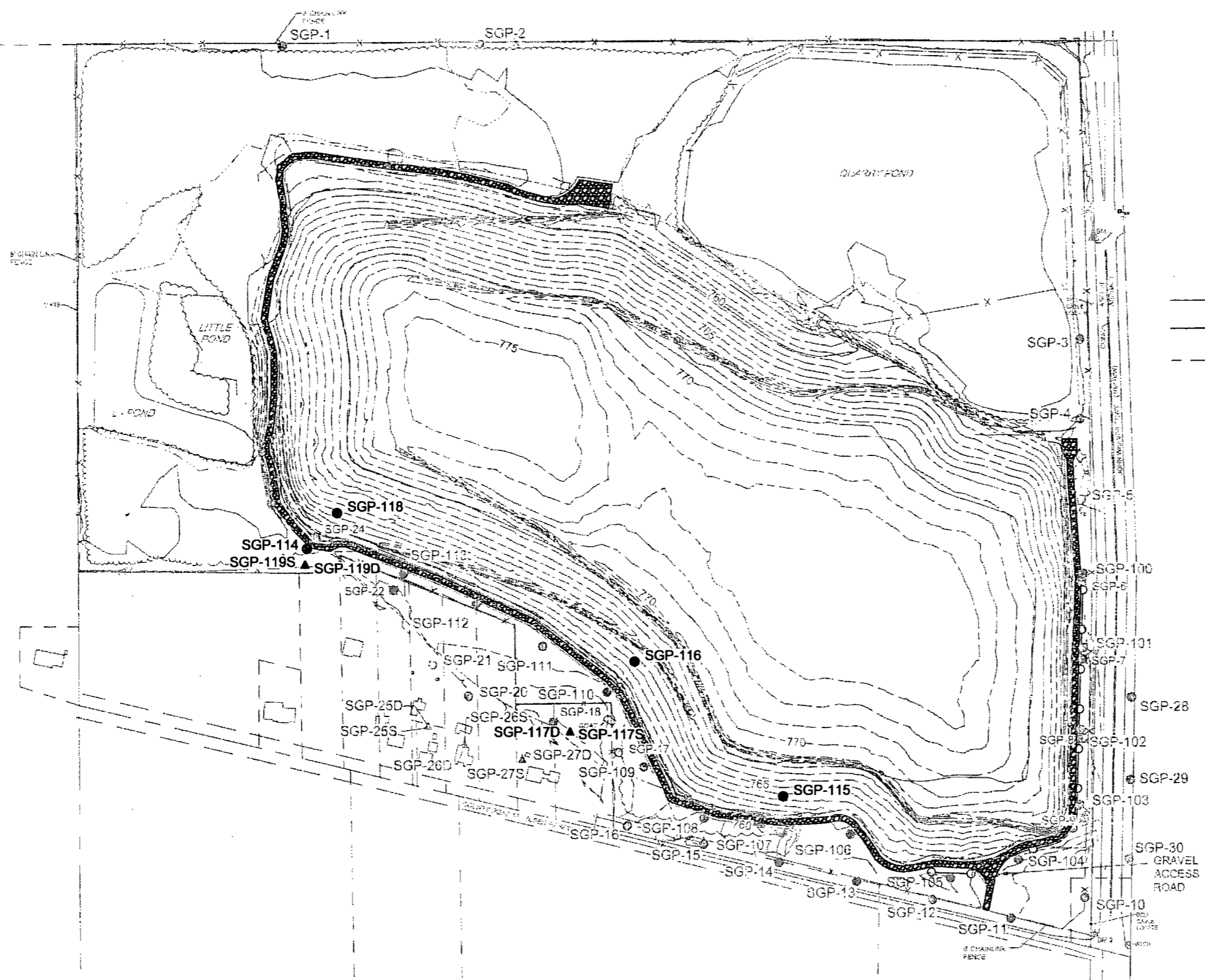
CONESTOGA-ROVERS & ASSOCIATES

Denise Gay Quigley, P. Eng., PE

Douglas M. Gatrell, PE

DQ/lp/45
Encl.

cc: Gary Toczylowski - Bayer HealthCare
Tom Lenz - Bayer HealthCare
Christopher Fassero - USACE (3 copies)
Doug Petroff - IDEM (2 copies)
Alan Van Norman- CRA

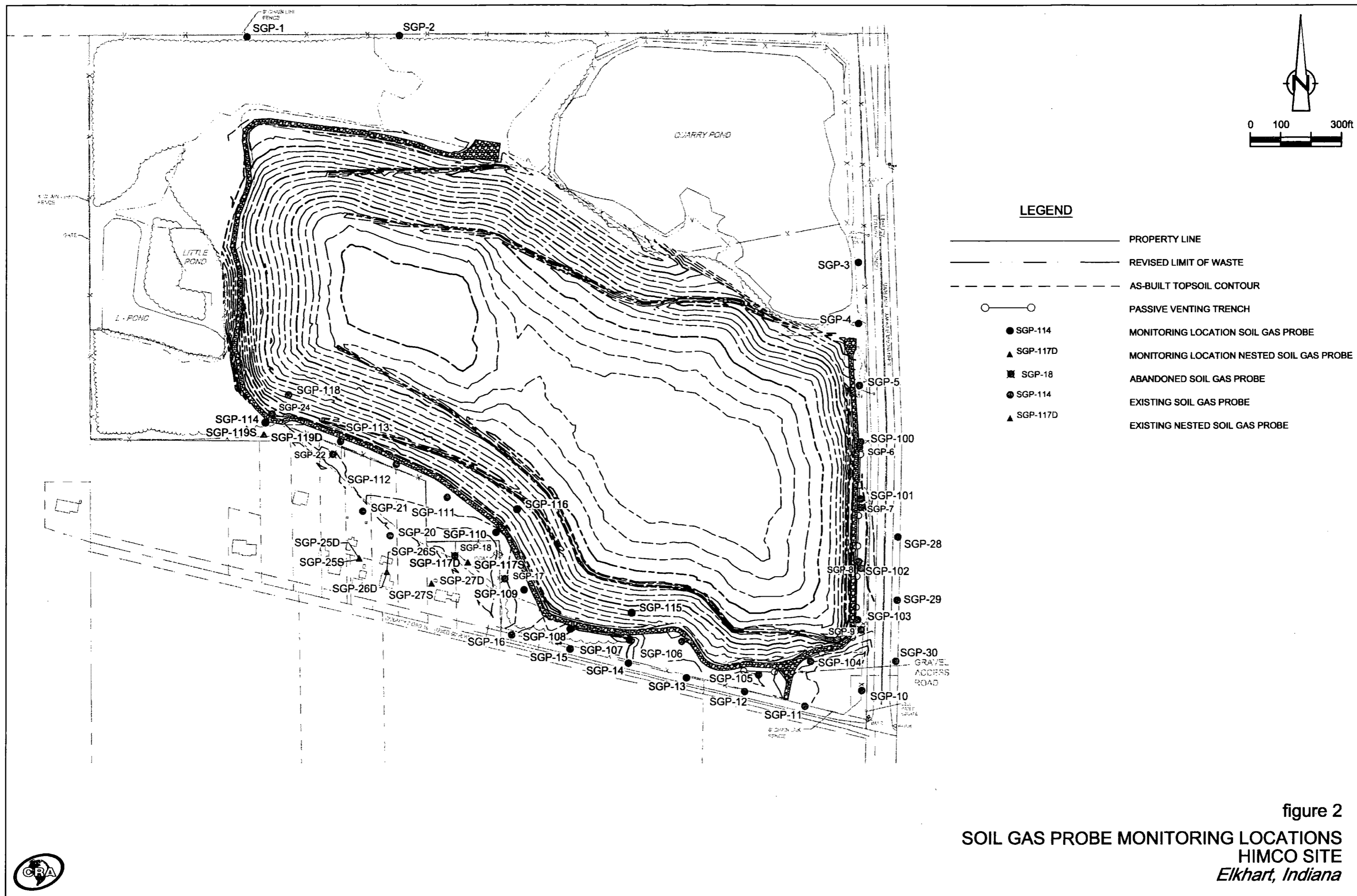


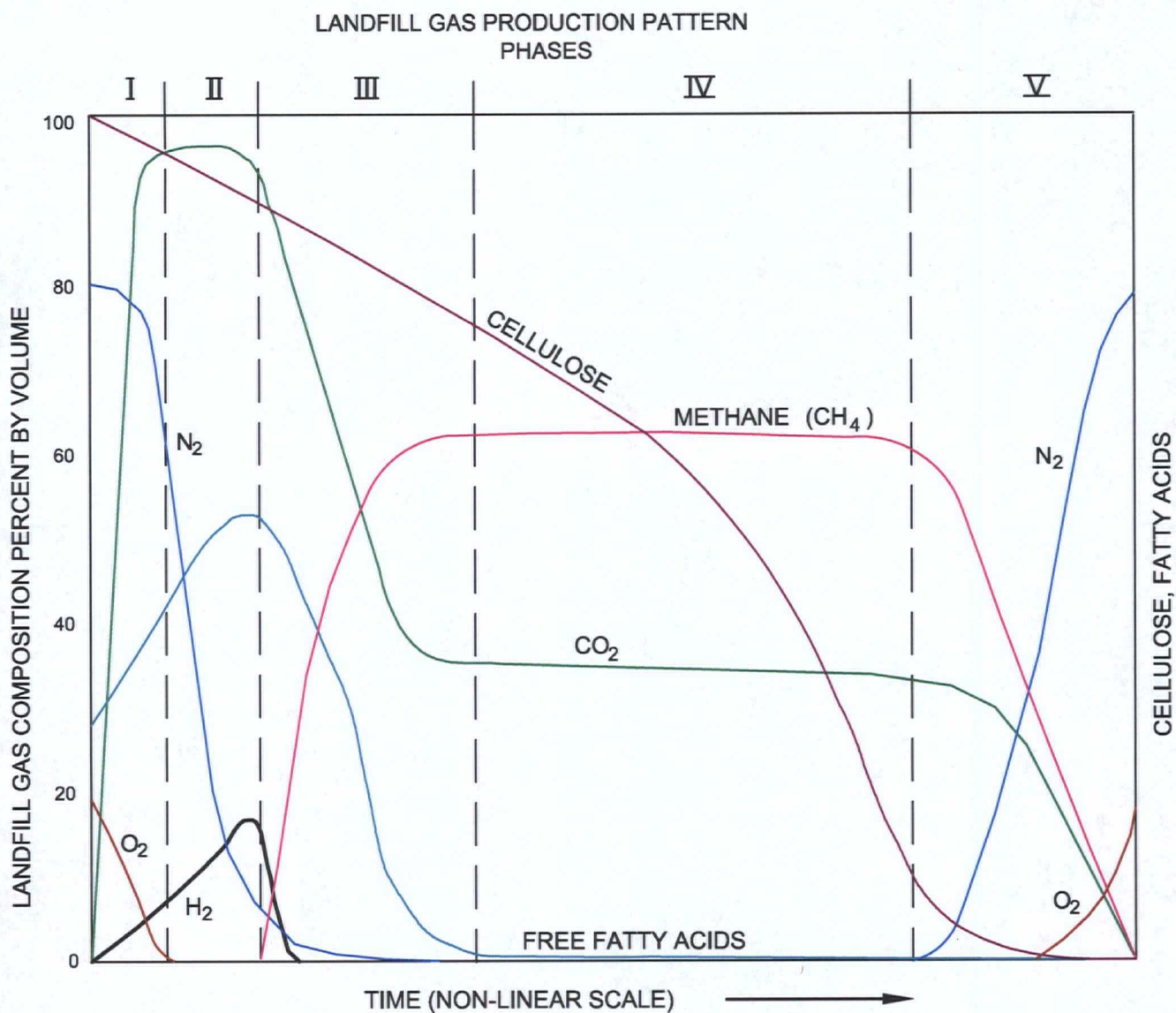
LEGEND

- PROPERTY LINE
- REVISED LIMIT OF WASTE
- - - - - AS-BUILT TOPSOIL CONTOUR
- — ○ PASSIVE VENTING TRENCH
- SGP-114 EXISTING SOIL GAS PROBE
- ▲ SGP-117D EXISTING NESTED SOIL GAS PROBE
- SGP-118 ABANDONED SOIL GAS PROBE

figure 1
 ADDITIONAL GAS PROBE LOCATIONS
 HIMCO SITE
 Elkhart, Indiana







PHASES	CONDITION	TIME FRAME - TYPICAL
I	AEROBIC	HOURS TO 1 WEEK
II	ANOXIC	1 TO 6 MONTHS
III	ANAEROBIC, METHANOGENIC, UNSTEADY	3 MONTHS TO 3 YEARS
IV	ANAEROBIC, METHANOGENIC, STEADY	8 TO 40 YEARS
V	ANAEROBIC, METHANOGENIC, DECLINING	1 TO 40+ YEARS
TOTAL		10 TO 80+ YEARS

SOURCE:

FARQUHAR AND ROVERS, 1973,
AS MODIFIED BY REES, 1980,
AND AUGENSTEIN & PACEY, 1991.

figure 3

TYPICAL LFG PRODUCTION STAGES
HIMCO SITE
Elkhart, Indiana



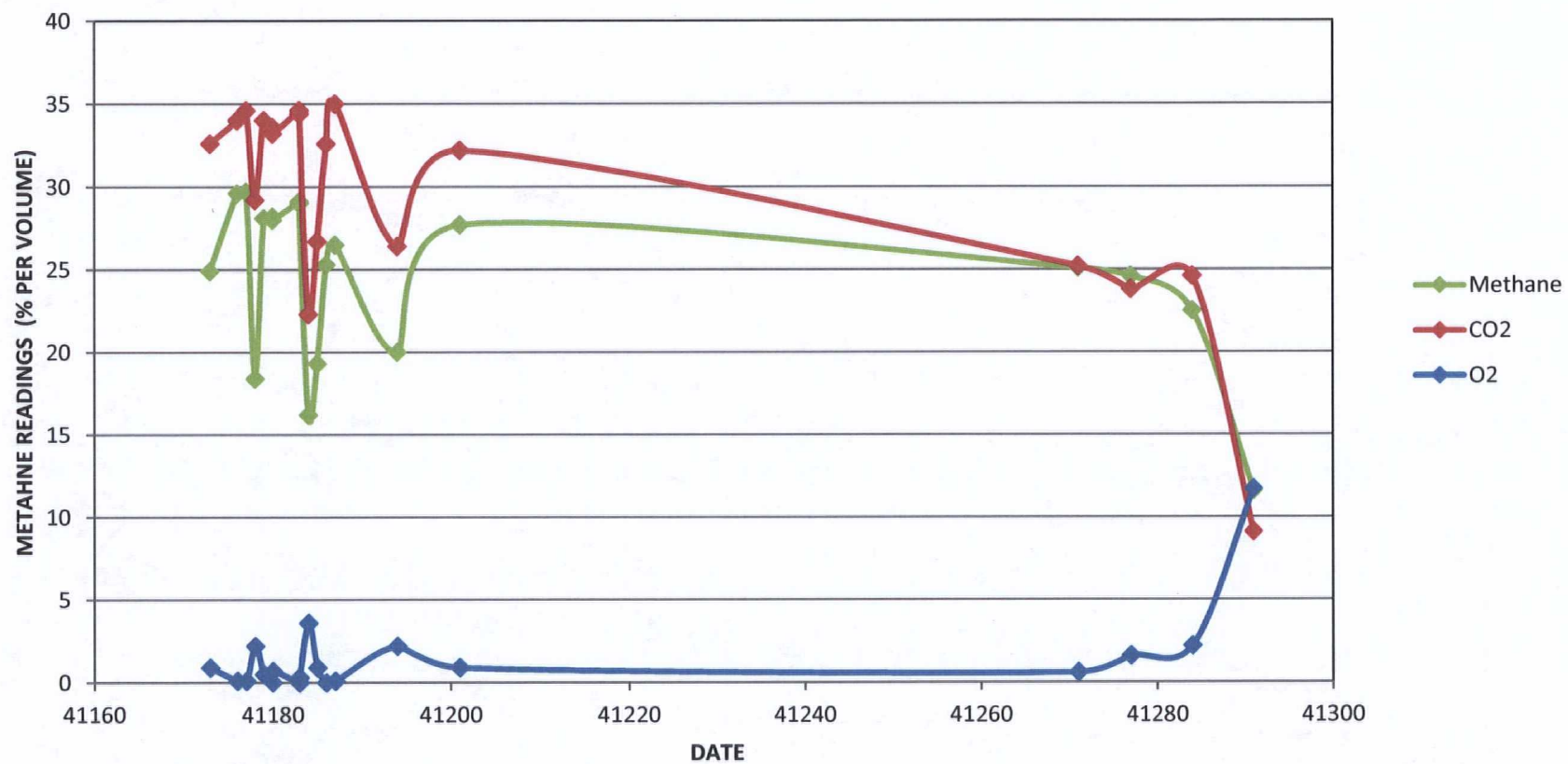


figure 4
METHANE READINGS AT SGP-107
HIMCO SITE
Elkhart, Indiana



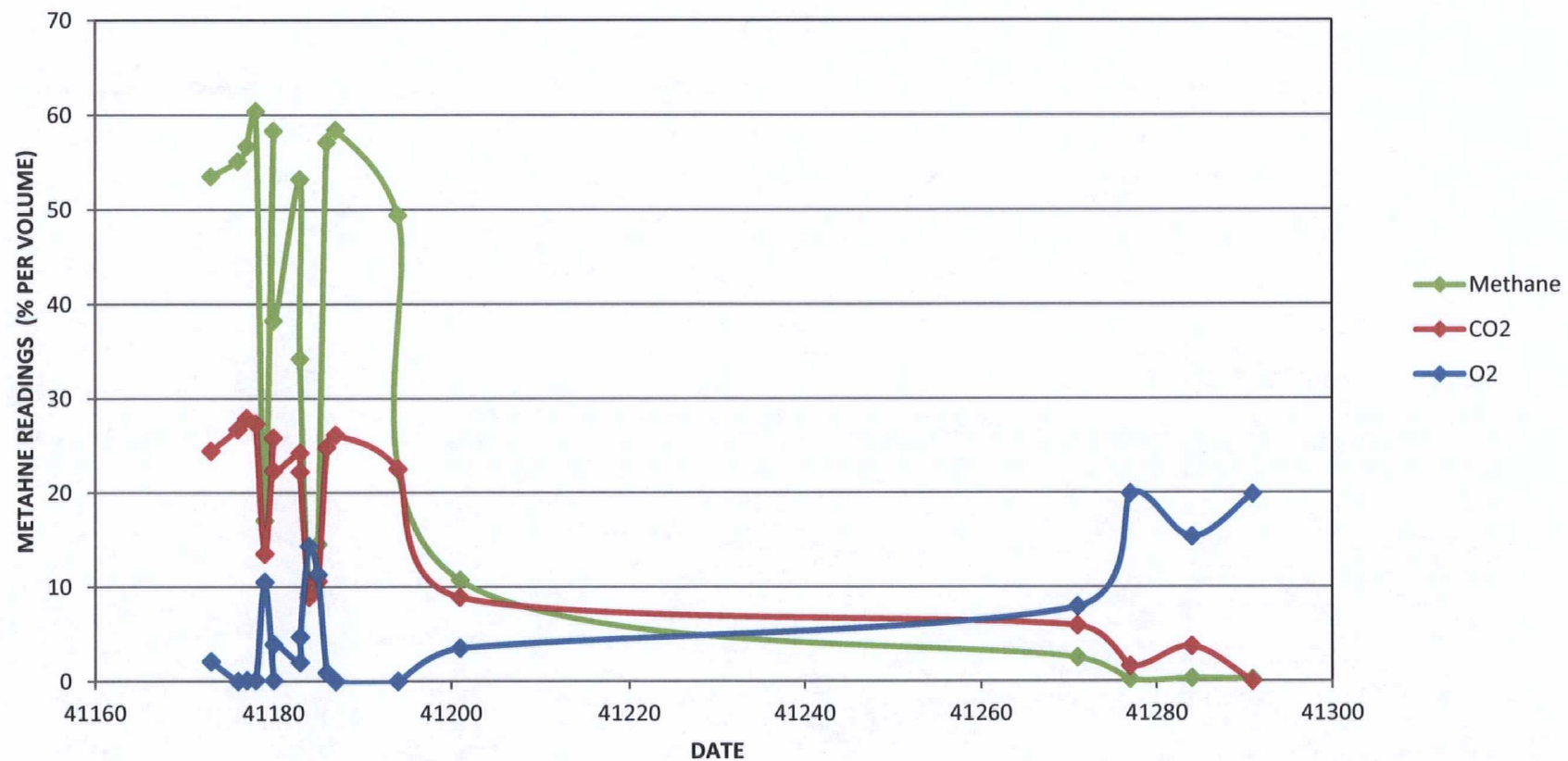


figure 5
METHANE READINGS AT SGP-110
HIMCO SITE
Elkhart, Indiana



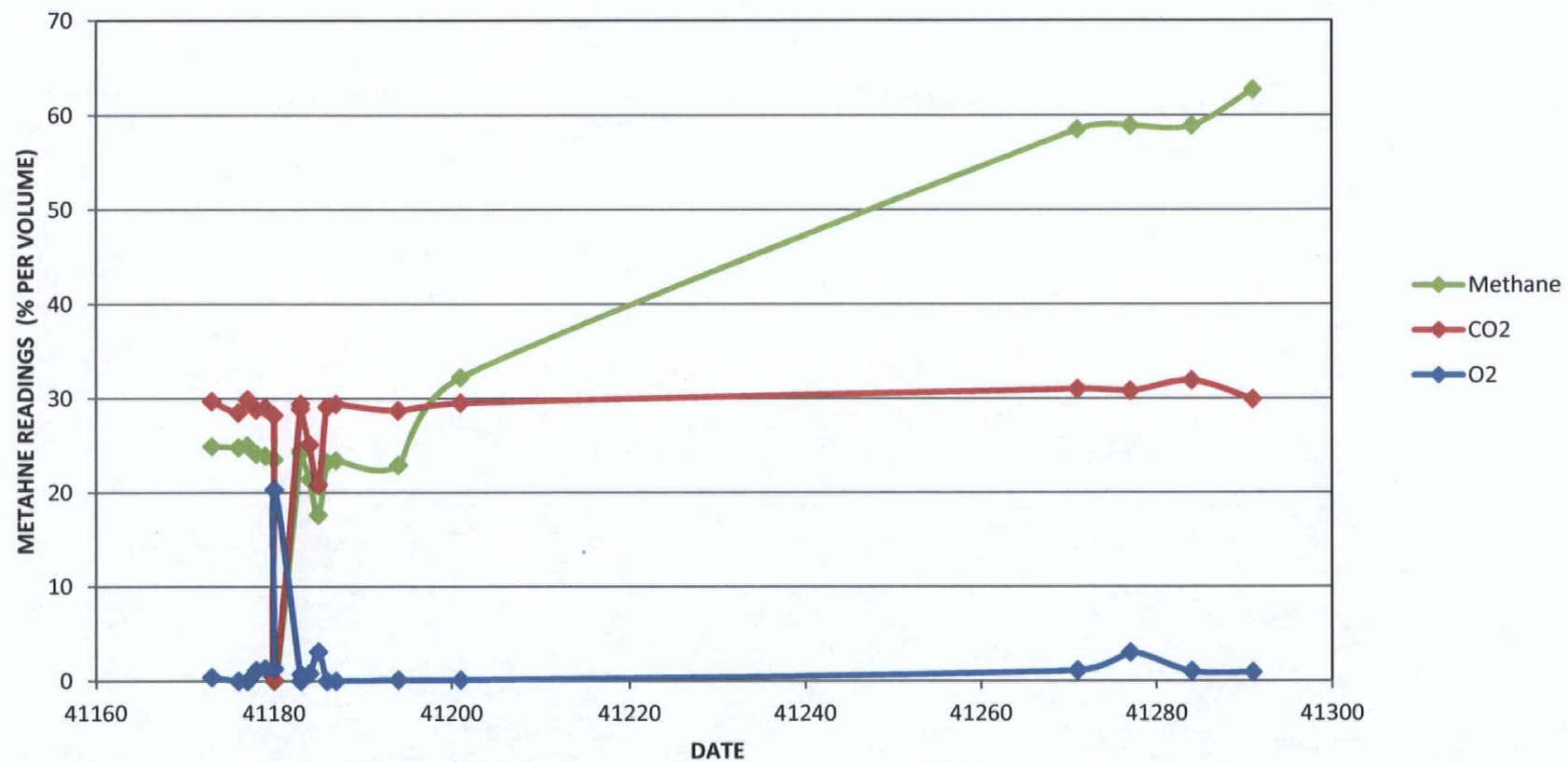


figure 6
METHANE READINGS AT SGP-114
HIMCO SITE
Elkhart, Indiana



TABLE 1

**SOIL GAS MONITORING DATA
HIMCO SITE
ELKHART, INDIANA**

<i>Location</i>	<i>Date</i>	<i>Pressure</i>	<i>Gas Quality/Combustible Gas Concentrations</i>			
		<i>(in H₂O)</i>	<i>Methane %¹</i>	<i>CO₂ %¹</i>	<i>O₂ %¹</i>	<i>H₂S %¹</i>
SGP-100	9/21/2012	0.0	0	6.1	16.3	0
	12/28/2012	0.0	2.1	7.4	15.4	0
SGP-101	9/21/2012	0.0	0	4.0	17.0	0
	12/28/2012	0.0	0.1	0.2	20.2	0
SGP-102	9/21/2012	0.0	0	3.8	16.1	0
	12/28/2012	0.0	0	0.9	20.0	0
SGP-103	9/21/2012	0.0	2.6	9.7	0.3	0
	12/28/2012	0.0	0.2	5.9	1.4	0
SGP-104	9/21/2012	0.0	0	8.4	12.1	0
	12/28/2012	0.0	0.2	3.4	12.6	0
SGP-105	9/21/2012	0.0	0	17.3	4.8	0
	12/28/2012	0.0	0.3	3.4	17.6	0
SGP-106	9/21/2012	0.0	0	13.0	10.9	0
	12/28/2012	0.0	0.7	9.8	15.4	0
SGP-107	9/21/2012	0.0	24.9	32.6	0.9	0
	9/24/2012	0.0	29.6	34.0	0.1	0
	9/25/2012	0.0	29.7	34.6	0.1	0
	9/26/2012	0.0	18.4	29.2	2.2	0
	9/27/2012	0.0	28.1	34.0	0.5	0
	9/28/2012	0.0	28.2	33.6	0.0	0
	9/28/2012 ²	0.0	28.0	33.2	0.7	0
	10/1/2012 ³	0.0	29.1	34.6	0.0	0
	10/1/2012 ²	0.0	29.0	34.4	0.3	0
	10/2/2012	0.0	16.2	22.3	3.6	0
	10/3/2012	0.0	19.3	26.7	0.9	0
	10/4/2012	0.0	25.3	32.6	0.0	0
	10/5/2012	0.0	26.5	35.0	0.1	0
	10/12/2012	0.0	20.0	26.4	2.2	0
	10/19/2012	0.0	27.7	32.2	0.9	0
	12/28/2012	0.0	25.1	25.2	0.6	0
	1/3/2013	0.0	24.6	23.8	1.6	0
	1/10/2013	0.0	22.5	24.6	2.2	0
	1/17/2013	0.0	11.6	9.1	11.7	0
SGP-108	9/21/2012	0.0	0.0	9.8	6.7	0
	12/28/2012	1.2	8.6	3.1	2.1	0
	1/3/2013	0.0	8.4	2.7	3.3	0
	1/10/2013	0.0	7.8	2.7	6.6	0
	1/17/2013	0.0	0.5	0.0	19.8	0
SGP-109	9/21/2012	0.0	1.3	8.4	6.3	0
	12/28/2012	1.5	8.8	5.7	0.3	0
	1/3/2013	0.0	3.4	3.4	12.1	0
	1/10/2013	0.0	5.9	5.2	4.0	0
	1/17/2013	0.0	9.2	5.4	1.1	0

TABLE 1

**SOIL GAS MONITORING DATA
HIMCO SITE
ELKHART, INDIANA**

<i>Location</i>	<i>Date</i>	<i>Pressure</i>	<i>Gas Quality/Combustible Gas Concentrations</i>			
		<i>(in H₂O)</i>	<i>Methane %¹</i>	<i>CO₂ %¹</i>	<i>O₂ %¹</i>	<i>H₂S %¹</i>
SGP-110	9/21/2012	0.0	53.5	24.4	2.1	0
	9/24/2012	0.0	55.1	26.7	0.0	0
	9/25/2012	0.0	56.7	27.9	0.1	0
	9/26/2012	0.0	60.4	27.3	0.1	0
	9/27/2012	0.0	17.0	13.5	10.5	0
	9/28/2012	0.0	58.3	25.8	0.1	0
	9/28/2012 ²	0.0	38.2	22.3	3.9	0
	10/1/2012 ³	0.0	53.2	24.2	2.0	0
	10/1/2012 ²	0.0	34.2	22.2	4.7	0
	10/2/2012	0.0	9.3	8.9	14.3	0
	10/3/2012	0.0	14.5	10.6	11.3	0
	10/4/2012	0.0	57.1	24.8	0.9	0
	10/5/2012	0.0	58.4	26.1	0.0	0
	10/12/2012	0.0	49.4	22.5	0.0	0
	10/19/2012	0.0	10.7	8.9	3.5	0
	12/28/2012	0.0	2.5	5.9	7.9	0
	1/3/2013	0.0	0.2	1.6	19.9	0
	1/10/2013	0.0	0.3	3.7	15.3	0
	1/17/2013	0.0	0.2	0.0	19.8	0
SGP-111	9/21/2012	0.0	0.0	7.1	11.4	0
	12/28/2012	0.0	0.3	0.1	21.3	0
SGP-112	9/21/2012	0.0	0.0	4.7	2.3	0
	12/28/2012	0.0	0.0	2.1	13.4	0
SGP-113	9/21/2012	0.0	1.4	7.6	2.0	0
	12/28/2012	0.0	0.0	3.5	9.2	0
SGP-114	9/21/2012	0.0	24.9	29.7	0.4	0
	9/24/2012	0.0	24.8	28.5	0.0	0
	9/25/2012	0.0	25.0	29.9	0.0	8
	9/26/2012	0.0	24.1	28.8	1.1	10
	9/27/2012	0.0	23.9	29.0	1.3	10
	9/28/2012	0.0	23.5	28.2	1.3	8
	9/28/2012 ²	0.0	0.0	0.1	20.3	0
	10/1/2012 ³	0.0	24.5	29.4	0.0	7
	10/1/2012 ²	0.0	24.2	28.9	0.7	8
	10/2/2012	0.0	21.4	25.1	0.8	0
	10/3/2012	0.0	17.6	20.8	3.1	0
	10/4/2012	0.0	23.2	29.1	0.0	0
	10/5/2012	0.0	23.4	29.4	0.0	0
	10/12/2012	0.0	22.9	28.7	0.1	0
	10/19/2012	0.0	32.2	29.5	0.1	0
	12/28/2012	0.0	58.5	31.0	1.1	6
	1/3/2013	0.0	58.9	30.8	3.0	5
	1/10/2013	0.0	58.9	31.9	1.0	4
	1/17/2013	0.0	62.7	29.9	0.9	0

TABLE 1

**SOIL GAS MONITORING DATA
HIMCO SITE
ELKHART, INDIANA**

<i>Location</i>	<i>Date</i>	<i>Pressure</i>	<i>Gas Quality/Combustible Gas Concentrations</i>			
		<i>(in H₂O)</i>	<i>Methane %¹</i>	<i>CO₂ %¹</i>	<i>O₂ %¹</i>	<i>H₂S %¹</i>
SGP-115	12/28/2012	1.3	34.5	36.5	1.3	0
	1/3/2013	0.0	34.8	35.6	2.4	0
	1/10/2013	0.0	35.6	36.6	6.9	0
	1/17/2013	0.0	0.3	0.0	20.2	0
SGP-116	12/28/2012	1.9	58.4	46.5	0.6	0
	1/3/2013	0.0	59.8	45.6	1.3	0
	1/10/2013	0.0	61.8	45.4	4.1	0
	1/17/2013	0.0	52.6	40.6	1.6	0
SGP-117S	12/28/2012	0.0	2.2	14.9	0.3	0
	1/3/2013	0.0	1.9	10.7	7.4	0
	1/10/2013	0.0	2.0	14.7	3.6	0
	1/17/2013	0.0	2.5	13.5	0.7	0
SGP-117D	12/28/2012	0.0	1.5	15.8	0.5	0
	1/3/2013	0.0	1.4	10.6	6.7	0
	1/10/2013	0.0	1.3	9.4	11.2	0
	1/17/2013	0.0	1.4	9.0	7.2	0
SGP-118	12/28/2012	0.0	60.0	41.4	1.2	0
	1/3/2013	0.0	61.1	41.5	1.1	0
	1/10/2013	1.9	0.3	0.0	19.7	0
	1/17/2013	0.0	0.2	0.0	21.3	0
SGP-119S	12/28/2012	0.0	4.8	7.6	15.3	0
	1/3/2013	0.0	4.0	7.2	16.0	0
	1/10/2013	0.0	2.6	6.2	16.0	0
	1/17/2013	0.0	10.4	10.5	14.5	0
SGP-119D	12/28/2012	0.0	6.8	12.4	11.5	0
	1/3/2013	0.0	5.3	4.4	11.2	0
	1/10/2013	0.0	3.8	11.2	13.0	0
	1/17/2013	0.0	15.6	15.3	10.0	0

**SOIL GAS MONITORING DATA
HIMCO SITE
ELKHART, INDIANA**

<i>Location</i>	<i>Date</i>	<i>Pressure</i>	<i>Gas Quality/Combustible Gas Concentrations</i>			
		<i>(in H₂O)</i>	<i>Methane %¹</i>	<i>CO₂ %¹</i>	<i>O₂ %¹</i>	<i>H₂S %¹</i>
SGP-13	9/24/2012	0.0	0.0	0.7	19.7	0
	9/25/2012	---	---	---	---	---
	9/26/2012	0.0	0.0	0.5	19.8	0
	9/27/2012	0.0	0.0	0.6	19.8	0
	9/28/2012	0.0	0.0	0.5	19.9	0
	10/1/2012	0.0	0.0	0.6	19.8	0
	10/2/2012	0.0	0.0	0.5	19.6	0
	10/3/2012	0.0	0.1	0.8	19.5	0
	10/4/2012	0.0	0.0	0.6	19.6	0
	10/5/2012	0.0	0.0	0.6	20.1	0
	10/12/2012	0.0	0.0	0.5	19.7	0
	10/19/2012	0.0	0.0	0.5	20.9	0
	12/28/2012	0.0	0.0	0.4	20.8	0
	1/3/2013	0.0	0.0	0.0	20.7	0
	1/10/2013	0.0	0.0	0.0	19.9	0
	1/17/2013	0.0	0.0	0.0	20.0	0
SGP-14	9/24/2012	0.0	0.0	0.6	19.6	0
	9/25/2012	---	---	---	---	---
	9/26/2012	0.0	0.0	0.6	19.8	0
	9/27/2012	0.0	0.0	0.6	19.9	0
	9/28/2012	0.0	0.0	0.6	20.1	0
	10/1/2012	0.0	0.0	0.7	19.9	0
	10/2/2012	0.0	0.0	0.6	19.8	0
	10/3/2012	0.0	0.0	0.6	19.9	0
	10/4/2012	0.0	0.0	0.6	19.5	0
	10/5/2012	0.0	0.0	0.5	20.3	0
	10/12/2012	0.0	0.0	0.7	20.7	0
	10/19/2012	0.0	0.0	0.5	20.4	0
	12/28/2012	0.0	0.0	0.1	20.6	0
	1/3/2013	0.0	0.0	0.4	20.6	0
	1/10/2013	0.0	0.0	0.0	20.5	0
	1/17/2013	0.0	0.0	0.0	20.4	0
SGP-15	9/24/2012	0.0	0.0	0.3	20.0	0
	9/25/2012	---	---	---	---	---
	9/26/2012	0.0	0.0	0.0	19.9	0
	9/27/2012	0.0	0.0	0.0	20.2	0
	9/28/2012	0.0	0.0	0.6	20.1	0
	10/1/2012	0.0	0.0	0.0	20.2	0
	10/2/2012	0.0	0.0	0.0	20.1	0
	10/3/2012	0.0	0.0	0.0	19.6	0
	10/4/2012	0.0	0.0	0.9	19.2	0
	10/5/2012	0.0	0.0	0.0	19.9	0
	10/12/2012	0.0	0.0	0.0	20.1	0
	10/19/2012	0.0	0.0	0.0	19.8	0
	12/28/2012	0.0	0.0	0.3	20.5	0
	1/3/2013	0.0	0.0	0.3	20.5	0
	1/10/2013	0.0	0.0	0.4	20.4	0
	1/17/2013	0.0	0.0	0.0	20.5	0

SOIL GAS MONITORING DATA
HIMCO SITE
ELKHART, INDIANA

Location	Date	Pressure	Gas Quality/Combustible Gas Concentrations			
		(in H ₂ O)	Methane % ¹	CO ₂ % ¹	O ₂ % ¹	H ₂ S % ¹
SGP-16	1/17/2013	0.0	0.0	0.0	19.9	0
SGP-27S	9/24/2012	0.0	0.0	0.7	19.7	0
	9/25/2012	---	---	---	---	---
	9/26/2012	0.0	0.0	0.0	20.1	0
	9/27/2012	0.0	0.0	0.7	19.8	0
	9/28/2012	0.0	0.0	0.6	19.6	0
	10/1/2012	0.0	0.0	0.6	20.1	0
	10/2/2012	0.0	0.0	0.6	19.9	0
	10/3/2012	0.0	0.0	0.8	19.8	0
	10/4/2012	0.0	0.0	0.8	19.2	0
	10/5/2012	0.0	0.0	1.0	19.6	0
	10/12/2012	0.0	0.0	0.7	20.0	0
	10/19/2012	0.0	0.0	0.8	19.9	0
	12/28/2012	0.0	0.0	0.2	21.1	0
	1/3/2013	(4)	(4)	(4)	(4)	(4)
	1/10/2013	0.0	0.2	0.0	20.0	0
	1/17/2013	0.0	0.0	0.0	20.3	0
SGP-27D	9/24/2012	0.0	0.0	0.7	19.8	0
	9/25/2012	---	---	---	---	---
	9/26/2012	0.0	0.0	0.9	19.5	0
	9/27/2012	0.0	0.0	0.9	19.7	0
	9/28/2012	0.0	0.0	0.8	19.4	0
	10/1/2012	0.0	0.0	0.9	19.6	0
	10/2/2012	0.0	0.0	0.8	19.7	0
	10/3/2012	0.0	0.0	0.9	19.7	0
	10/4/2012	0.0	0.0	1.1	18.8	0
	10/5/2012	0.0	0.0	1.0	19.8	0
	10/12/2012	0.0	0.0	0.9	19.8	0
	10/19/2012	0.0	0.0	1.0	19.8	0
	12/28/2012	0.0	0.0	0.2	21.0	0
	1/3/2013	0.0	0.0	0.5	20.4	0
	1/10/2013	0.0	0.0	0.2	19.6	0
	1/17/2013	0.0	0.2	0.0	20.3	0

Notes:

1- Percent by volume

2- Valve opened for 30 minutes and closed prior to reading

3- Valves at SGP107, SGP110 and SGP114 were left open overnight on October 1, 2012

4- Broken valve; no monitoring at this location on this date

ATTACHMENT 1

BOREHOLE LOGS



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-115
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	NORTHING: 2351966.14 EASTING: 235188.95 TOP OF CASING TOP OF RISER GROUND SURFACE	767.81 767.44 763.70						
2	CL-SILTY CLAY, with sand, trace gravel, soft, low plasticity, brown, wet - stiff, moist at 1.5ft BGS		CONCRETE BENTONITE CHIPS 1/2" PVC WELL CASING	1GP		80		0.0
4	SP-SAND (FILL), with construction debris (brick, bits of plastic), dark brown to black	761.10	1/2" PVC WELL SCREEN					0.1
6	- no debris, fine grained, compact, reddish brown, slightly moist at 6.0ft BGS - brown at 6.5ft BGS - with plastic debris, brown at 7.2ft BGS		3" BOREHOLE					0.1
8		755.70	3/8" CLEAR STONE	2GP		100		0.1
10	SP-SAND, fine to medium grained, poorly graded, compact, brown, slightly moist		GRANULAR BENTONITE					0.1
12	- very moist to wet at 11.0ft BGS - wet at 12.0ft BGS			3GP		60		0.0
14	- gray at 13.0ft BGS - medium grained at 13.5ft BGS		NATURAL COLLAPSE					0.0
16	END OF BOREHOLE @ 15.0ft BGS	748.70						
18								

WELL DETAILS
Screened interval:
760.70 to 756.70ft
3.00 to 7.00ft BGS
Length: 4ft
Diameter: 0.5in
Material: PVC
Sand Pack:
760.90 to 752.70ft
2.80 to 11.00ft BGS
Material: 3/8" CLEAR STONE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA_CORP.GDT 2/11/13



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-116
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	N' VALUE	PID (ppm)
	NORTHING: 2352305.1 EASTING: 234808.97 TOP OF CASING TOP OF RISER GROUND SURFACE	766.84 766.58 763.24						
2	CL-SILTY CLAY, with sand, trace gravel, low plasticity, soft, brown, very moist - firm at 0.8ft BGS	761.44	CONCRETE	1GP	80			0.0
	FILL, crushed stone, with sand, white/tan	760.44	BENTONITE CHIPS					
4	SP-SAND (FILL), trace silt, fine grained, compact, poorly graded, brown, moist - silty at 3.3ft BGS - red brick debris at 3.6ft BGS - red brick debris at 3.9ft BGS		1/2" PVC WELL CASING					0.0
6			1/2" PVC WELL SCREEN	2GP	80			
			3" BOREHOLE					
			3/8" CLEAR STONE					0.4
8	FILL, gravel-like material, coarse to regular form, liquid weight, black, slag, wet - strong hydrocarbon-like odor at 7.5ft BGS	756.64	GRANULAR BENTONITE					
	SP-SAND (FILL), trace gravel, poorly graded, medium grained, gray to brown, very moist - no gravel, wet at 8.0ft BGS	755.74						
10	PT-PEAT, wood, roots, organic material, dark brown, slightly moist, strong hydrocarbon odor	754.54	NATURAL COLLAPSE					0.3
	END OF BOREHOLE @ 10.0ft BGS	753.24						
12								
14								
16								
18								

WELL DETAILS
Screened interval:
760.14 to 757.64ft
3.10 to 5.60ft BGS
Length: 2.5ft
Diameter: 0.5in
Material: PVC
Sand Pack:
760.24 to 756.64ft
3.00 to 6.60ft BGS
Material: 3/8" CLEAR STONE

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA_CORP.GDT 2/11/13



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-117D
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	NORTHING: 2352127.99 EASTING: 234644.33 TOP OF CASING TOP OF RISER GROUND SURFACE	767.80 766.91 763.95						
2	CL-SILTY CLAY, with sand, trace gravel, firm, low plasticity, brown, moist - soft, very moist at 3.2ft BGS - stiff, moist at 3.7ft BGS - firm at 5.0ft BGS		CONCRETE BENTONITE CHIPS 3/8" NYLON WELL CASING 2" BOREHOLE	1GP		80		0.0
4								0.0
6								0.0
8				2GP		100		0.0
10	GLASS DEBRIS, broken bits SP-SAND, trace silt, fine grained, compact, poorly graded, brown, moist - brown at 11.0ft BGS - very moist to wet at 12.0ft BGS - medium grained, gray at 13.3ft BGS	755.65 755.55	3/8" STAINLESS STEEL MESH WELL SCREEN 10/20 SAND NATURAL COLLAPSE					0.0
12				3GP		60		0.0
14								0.0
16	END OF BOREHOLE @ 15.0ft BGS	748.95						
18								

WELL DETAILS
Screened interval:
753.95 to 752.95ft
10.00 to 11.00ft BGS
Length: 1ft
Diameter: 0.4in
Material: 3/8" STAINLESS STEEL MESH SCREEN
Sand Pack:
754.45 to 751.95ft
9.50 to 12.00ft BGS
Material: 10/20 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA CORP.GDT 2/11/13

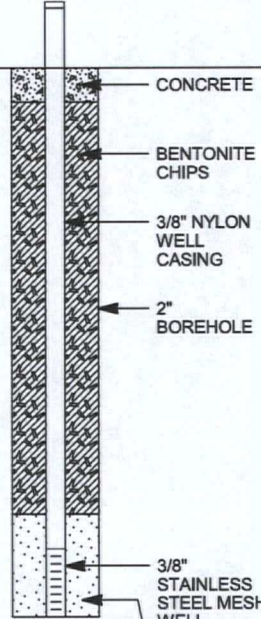


STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-117S
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
	NORTHING: 2352127.66 EASTING: 234647.09 TOP OF CASING TOP OF RISER GROUND SURFACE	767.83 766.84 763.94						
	CL-SILTY CLAY, with sand, trace gravel, firm, low plasticity, brown, moist		CONCRETE BENTONITE CHIPS 3/8" NYLON WELL CASING 2" BOREHOLE					
-2								
-4	- soft, very moist at 3.2ft BGS - stiff, moist at 3.7ft BGS							
-6	- firm at 5.0ft BGS							
-8	END OF BOREHOLE @ 8.0ft BGS	755.64	3/8" STAINLESS STEEL MESH WELL SCREEN 10/20 SAND					
-10			WELL DETAILS Screened interval: 756.94 to 755.94ft 7.00 to 8.00ft BGS Length: 1ft Diameter: 0.4in Material: 3/8" STAINLESS STEEL MESH SCREEN Sand Pack: 757.44 to 755.94ft 6.50 to 8.00ft BGS Material: 10/20 SAND					
-12								
-14								
-16								
-18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA_CORP.GDT 2/11/13



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-118
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	NORTHING: 2352679.88 EASTING: 234050.56 TOP OF CASING TOP OF RISER GROUND SURFACE	766.02 765.72 762.57						
	TOPSOIL, with grass and roots	762.37	CONCRETE					
	CL-SILTY CLAY, with sand, trace gravel, low plasticity, stiff, brown, moist		BENTONITE CHIPS					0.0
2	FILL, calcium-sulfate like material, fine grained powder, compact, white	760.57		1GP		80		
	FILL, construction debris, layers of wood, plywood, yellow foam, plastic sheet, newspaper	759.87	1/2" PVC WELL CASING 3" BOREHOLE					3.8
4								
	OLD TOPSOIL, with roots, silty sand material, loose, brown to black, slightly moist	757.77	1/2" PVC WELL SCREEN					
6	SP-SILTY SAND, fine to medium grained, compact, poorly graded, dark brown, slightly moist - brown at 6.5ft BGS	757.07						0.2
8	- gray, moist at 7.7ft BGS		3/8" CLEAR STONE	2GP		90		
	- very moist to wet at 8.8ft BGS		GRANULAR BENTONITE					0.0
	- brown, wet at 9.3ft BGS		NATURAL COLLAPSE					
10	END OF BOREHOLE @ 10.0ft BGS	752.57						
12			WELL DETAILS Screened interval: 758.87 to 755.37ft 3.70 to 7.20ft BGS Length: 3.5ft Diameter: 0.5in Material: PVC Sand Pack: 759.57 to 754.57ft 3.00 to 8.00ft BGS Material: 3/8" CLEAR STONE					
14								
16								
18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA CORP.GDT 2/11/13



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-119D
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	NORTHING: 2352547.97 EASTING: 233971.11 TOP OF CASING TOP OF RISER GROUND SURFACE	766.70 765.94 762.96						
	TOPSOIL, with grass and roots	762.66	CONCRETE					
	SP-SAND, with silt, fine to medium grained, compact, poorly graded, brown, moist		BENTONITE CHIPS					0.2
2	- reddish brown at 1.8ft BGS			1GP		90		
4	- light brown at 3.0ft BGS		3/8" NYLON WELL CASING					0.1
6	- trace silt, loose, reddish brown, slightly moist at 6.2ft BGS		2" BOREHOLE					0.2
8	- gray at 7.0ft BGS - compact, brown at 7.2ft BGS		3/8" STAINLESS STEEL MESH WELL SCREEN	2GP		96		
10	- light brown, moist at 8.1ft BGS - brown, wet at 8.8ft BGS		10/20 SAND					0.1
10	END OF BOREHOLE @ 10.0ft BGS	752.96	NATURAL COLLAPSE					
12			<u>WELL DETAILS</u> Screened interval: 755.96 to 753.96ft 7.00 to 9.00ft BGS Length: 2ft Diameter: 0.4in Material: 3/8" STAINLESS STEEL MESH SCREEN Sand Pack: 756.46 to 753.96ft 6.50 to 9.00ft BGS Material: 10/20 SAND					
14								
16								
18								
<u>NOTES:</u> MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE								

OVERBURDEN LOG 039611WIN.GPJ CRA CORP.GDT 2/11/13



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

Page 1 of 1

PROJECT NAME: HIMCO SITE
PROJECT NUMBER: 39611
CLIENT: BAYER HEALTHCARE LLC
LOCATION: ELKHART, IN

HOLE DESIGNATION: SGP-119S
DATE COMPLETED: December 18, 2012
DRILLING METHOD: DIRECT PUSH
FIELD PERSONNEL: M. GROVES

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	'N' VALUE	
	NORTHING: 2352547.71 EASTING: 233967.69 TOP OF CASING TOP OF RISER GROUND SURFACE	766.49 765.96 762.87						
	TOPSOIL, with grass and roots	762.57	CONCRETE					
	SP-SAND, with silt, fine to medium grained, compact, poorly graded, brown, moist		BENTONITE CHIPS					
2	- reddish brown at 1.8ft BGS		3/8" NYLON WELL CASING					
4	- light brown at 3.0ft BGS		2" BOREHOLE 3/8" STAINLESS STEEL MESH WELL SCREEN					
6	END OF BOREHOLE @ 5.5ft BGS	757.37	WELL DETAILS Screened interval: 758.37 to 757.37ft 4.50 to 5.50ft BGS Length: 1ft Diameter: 0.4in Material: 3/8" STAINLESS STEEL MESH SCREEN Sand Pack: 758.87 to 757.37ft 4.00 to 5.50ft BGS Material: 10/20 SAND					
8								
10								
12								
14								
16								
18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 039611WIN.GPJ CRA CORP.GDT 2/11/13